Research Article

BIOMEDICAL Journal of Scientific & Technical Research

ISSN: 2574 -1241

DOI: 10.26717/BJSTR.2026.67.010486

Radiographers-Led Intravenous Contrast Media Administration: A Systematic Review of Radiologists' and Radiographers' Perceptions

Agwu Emeka John[1]*, Mbah Okechukwu Anthony[2], Usoro Inwang[3], Ogunkola John Olayiwola[4] and Kalu Chigbo Okorie[5]

[1]*Department of Radiology, Obafemi Awolowo University Teaching Hospital Ife, Nigeria.*

[2]*Misericordia University Hospital, Ireland*

[3]*Department of Radiography, College of Medicine Lead City University, Nigeria*

[4]*Medway Maritime Hospital NHS Foundation Trust, UK*

[5]*Nigerian Navy Hospital Borokiri, Nigeria*

***Corresponding author:** Agwu Emeka John, Department of Radiology, Obafemi Awolowo University Teaching Hospital Ife, Nigeria

ARTICLE INFO

Received: October 28, 2026

Published: November 23, 2026

Citation: Agwu Emeka John, Mbah Okechukwu Anthony, Usoro Inwang, Ogunkola John Olayiwola and Kalu Chigbo Okorie. Radiographers-Led Intravenous Contrast Media Administration: A Systematic Review of Radiologists' and Radiographers' Perceptions. Biomed J Sci & Tech Res 67(3)-2026. BJSTR. MS.ID.010486.

ABSTRACT

Background: Shifting the task of intravenous (IV) contrast media administration away from radiologists and onto radiographers is becoming widespread globally. This practice helps cope with radiologist shortages and increases department productivity. Even so, opinions concerning patient safety, legal liabilities, and professional governance remain debated, particularly in developing and middle-income regions.

Objectives: To systematically analyze available research regarding how radiologists and radiographers view radiographer-led IV contrast administration.

Methods: This review aligned with PRISMA 2020 standards (Page, et al. [1]) and was registered on PROSPERO (CRD420261459383). Major databases and grey literature sources were searched from inception through July 2026. Eligibility guidelines used an expanded PICO framework tailored for perception studies. The Joanna Briggs Institute critical appraisal tool evaluated analytical cross-sectional studies. Narrative synthesis was utilized, and findings were graded via GRADE-CERQual.

Results: Out of 1,285 retrieved citations, five papers involving 754 total participants (142 radiologists and 612 radiographers) met the selection criteria. Six primary themes were identified:

(i) Overall professional acceptance levels varying from 63.6% to 80%;

(ii) Legal and liability worries ranging from 52.7% to 85%;

(iii) patient safety confidence spanning 74% to 78%, contingent upon proper training;

(iv) Educational demands between 85% and 97%, focusing on resuscitation, pharmacology, and managing adverse events;

(v) Governance gaps concerning informed consent, contrast selection, dosage, and injection site choices; and

(vi) Operational advantages, with 93% noting improved patient turnaround and shorter waiting times. Study quality varied from moderate to high, with moderate grade-cerqual confidence for most outcomes.

Conclusion: Support for radiographer-delivered IV contrast relies heavily on certified training programs, explicit legal frameworks, and standardized institutional governance.

Keywords: Radiographer; Contrast Media; Role Extension; Perception; Patient Safety

Introduction

Expanding the professional duties of radiographers to manage responsibilities typically handled by radiologists has become a core element of modern medical imaging practice (White, 2004). With the rapid rise of teleradiology, contrast administration remains one of the few duties requiring a radiologist's physical presence. White (2004) described professional role development along a spectrum starting from basic task extension up to advanced clinical practice, where procedures like IV cannulation and contrast injection represent entry-level tasks that precede independent image reporting and invasive interventions. This shift has accelerated worldwide due to climbing diagnostic demands, persistent radiologist deficits, and administrative goals for streamlined service delivery (Price & Le Masurier [2,3]). Within the United Kingdom (UK), the College of Radiographers officially authorized radiographers to administer IV contrast media back in 2005, provided appropriate local training and protocols were met (College of Radiographers [4]). Similarly, the Australian Society of Medical Imaging and Radiation Therapy issued competency guidelines establishing contrast injection as part of a diagnostic radiographer's remit under local credentialing (Australian Institute of Radiography [5]). In a long-term UK study, (Price and Le Masurier [2]) showed that 78% of departments had adopted radiographer-administered injections by 2006, pointing to fewer exam delays and greater radiologist availability for complex diagnostic reporting.

The (Society of Radiographers [3]) reinforced this position, stating that contrast injection is not restricted exclusively to medical doctors and can be delegated when training and governance requirements are satisfied.

Comparable shifts have occurred across Canada and parts of Europe, where technologists deliver contrast under medical directives. In developing a role-expansion model for Zambia, (Bwanga, et al. [6]) identified IV contrast delivery as a key area where radiographers frequently perform injections informally without legal protection, exposing risks caused by gaps between official policy and clinical reality. South Africa faces similar challenges; the (Health Professions Council of South Africa (HPCSA) [7]) ethical rules state that radiographers cannot exceed their registered scope without formal authorization. (Kekana, et al. [8]) reported that 68.5% of South African radiographers administered contrast despite unclear legal coverage, while (Munro, et al. [9]) observed that radiologists felt ambivalent, with 52.7% voicing liability concerns. In Nigeria, unrecorded evidence suggests that cannulation, dosage calculations, and contrast injections are routinely performed by radiographers in private clinics and community hospitals, whereas tertiary institutions often prohibit the practice. Nevertheless, Idowu and (Okedere [10]) noted that due to severe radiologist shortages, radiographers routinely perform contrast procedures across many diagnostic centers, private hospitals, and state teaching facilities in Nigeria.

The legal and liability dimension is especially critical. IV contrast procedures carry risks of extravasation, allergic reactions, and contrast-induced nephrotoxicity, demanding quick recognition and management of adverse events. The (Radiological Society of South Africa (RSSA) [11]) stated that choosing contrast types, calculating doses, and obtaining informed consent remain medical responsibilities, even though the physical injection can be delegated to trained radiographers. This division between consent and administration creates regulatory friction, particularly between private and public healthcare sectors (Koch, et al. 2018). Private facilities often maintain strict direct supervision because of medical malpractice insurance structures, whereas public hospitals lean heavily on task-shifting to cope with massive patient volumes (Koch, et al. 2018; Munro, et al. [9]). Perceptions of patient safety are tightly linked to educational preparation. In an Australian survey involving 90 radiographers and radiologists, (Toh, et al. [12]) found a 74% confidence level in radiographer competency, provided emergency resuscitation training was mandatory. In Malaysia, Zain et al. (2016) reported that 80% of radiologists accepted radiographer administration if certified pharmacology training was completed. These findings mirror evidence from advanced image interpretation; (Brealey, et al. [13]) proved that trained radiographers match radiologist diagnostic accuracy for routine X-ray readings, confirming that structured education supports safe role extension.

Despite a growing body of primary literature, no prior systematic review has consolidated the attitudes of both radiologists and radiographers specifically regarding IV contrast administration. Existing reviews concentrate on image reporting or general task expansion (Brealey, et al. [13]), leaving a gap in our understanding of the specific barriers and facilitators unique to contrast media delivery. This insight is vital for policy reform, particularly in regions lacking harmonized guidelines. A systematic synthesis utilizing rigorous methods like PRISMA 2020 (Page, et al. [1]), Joanna Briggs Institute appraisal tools (Moola, et al. [14]), and GRADE-CERQual (Lewin, et al. [15]) is therefore necessary to guide education, governance, and workforce planning. This systematic review aims to identify, evaluate, and synthesize empirical findings regarding radiologist and radiographer perceptions of radiographer-led IV contrast administration, and to provide actionable recommendations for policy, training, and clinical practice.

Methods

This systematic review was conducted in accordance with PRISMA 2020 statement (Page, et al. [1]) and prospectively registered on PROSPERO (CRD420261459383).

Eligibility Criteria

Inclusion criteria followed an expanded PICO framework for perception studies.

Population: Qualified radiologists and diagnostic radiographers (including radiological technologists).

Phenomenon of Interest: Perceptions, attitudes, beliefs, and opinions regarding radiographer-administered IV contrast media (iodinated and gadolinium agents).

Context: Any healthcare environment (public, private, academic) in any geographic location.

Study Design: Cross-sectional surveys, mixed-methods studies containing a survey component, and qualitative studies.

Exclusion Criteria:

(i) Editorials, commentaries, and non-empirical position statements;

(ii) Studies measuring technical competence purely through objective testing without perception data;

(iii) Studies focusing exclusively on nursing staff or non-radiographer groups; and

(iv) Non-english publications due to translation constraints

Search strings combined MeSH terms and text words using Boolean operators: (radiographer OR radiologic technologist OR diagnostic radiographer OR medical imaging technologist) AND (contrast media OR contrast agent OR intravenous contrast OR iodinated contrast OR gadolinium) AND (administration OR injection OR cannulation) AND (perception OR attitude OR opinion OR belief OR view). Language was limited to English with no publication date filters applied.

Information Sources and Search Strategy

Eight electronic databases were searched from inception through July 15, 2026: Cochrane Database of Systematic Reviews (CDSR), CINAHL (EBSCOhost), Embase (Ovid), MEDLINE (PubMed), PubMed, Scopus, Science Citation Index Expanded (Web of Science), and OpenGrey. Professional websites and reference lists of retrieved papers were also manually checked.

Selection Process

Records were imported into EndNote 21 to remove duplicates. Two independent reviewers screened titles and abstracts against inclusion criteria. Potentially relevant full-text articles were retrieved and evaluated independently, with disagreements settled through consensus or consultation with a third reviewer. Selection results are summarized via a PRISMA flowchart (Figure 1).

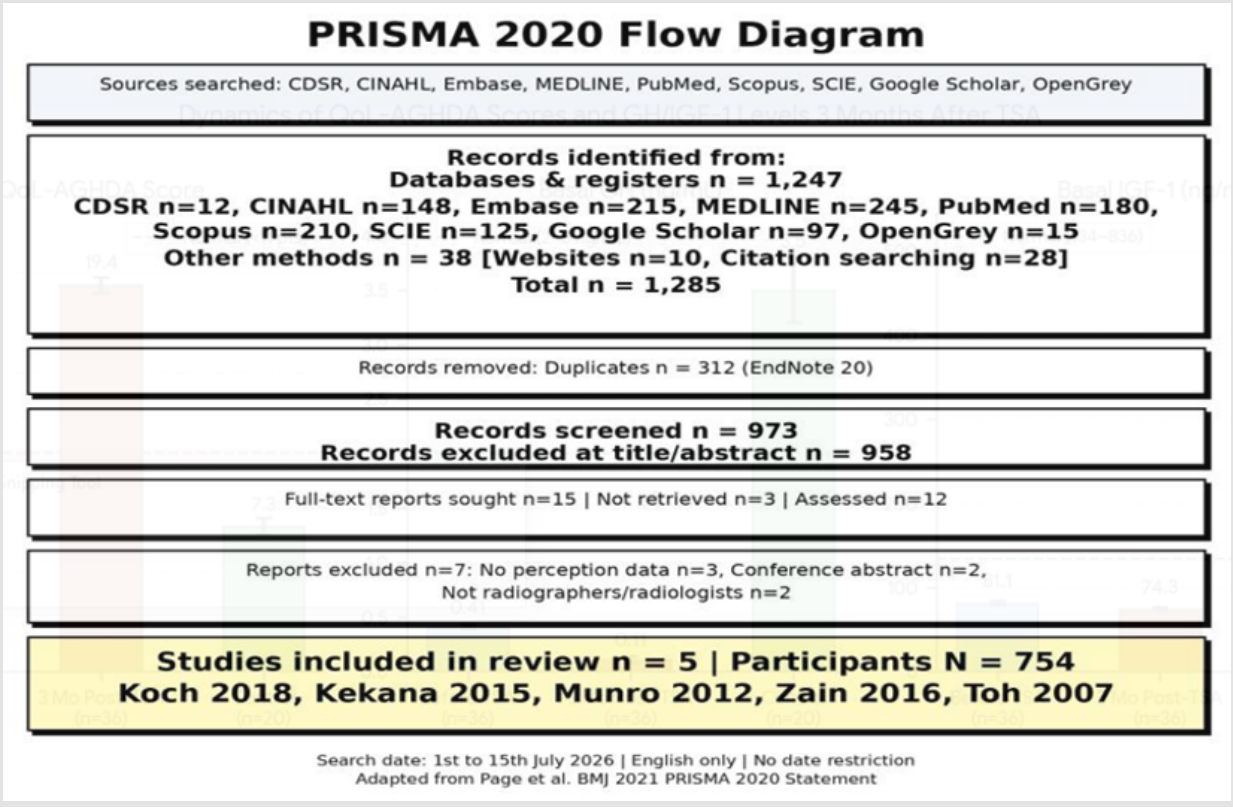

Figure 1: PRISMA 2020 Flow Diagram.

Data Extraction

A standardized extraction form captured 13 parameters: author, publication year, country, setting, objective, design, sampling technique, sample size, participant groups, response rate, survey instrument, measured perception themes, main findings, and funding sources. Two reviewers performed extraction independently and verified the results.

Quality Appraisal

Methodological quality was appraised using the Joanna Briggs Institute (JBI) Checklist for Analytical Cross-Sectional Studies, which contains eight criteria covering inclusion criteria, setting clarity, exposure measurement, confounding identification, outcome measurement, and statistical analysis (Moola, et al. [14]). Items were scored as Yes, No, Unclear, or Not Applicable. Studies were not excluded based on quality scores, but quality ratings guided the narrative synthesis and confidence evaluations.

Data Synthesis and Confidence Assessment

Because of significant clinical and methodological heterogeneity across survey tools and outcomes, a narrative synthesis was performed following (Popay, et al. [16]). Thematic analysis grouped recurring perceptual concepts. Review findings were graded using GRADE-CERQual to evaluate methodological limitations, coherence, data adequacy, and relevance (Lewin, et al. [15]).

Results

Study Selection

Database searches yielded 1,285 records. After removing 312 duplicates, 973 titles and abstracts were screened, leading to the exclusion of 958 irrelevant papers. Fifteen full-text articles were retrieved for full review, of which ten were excluded due to non-empirical status (n=3), lack of perception data (n=2), duplicate datasets (n=1), unretrievable texts (n=3), or non-English language (n=1). Five studies met all inclusion criteria (Toh, et al. [8,9,12]; Zain, et al. 2016; Koch et al. 2018).

Study Characteristics

The five selected papers were published between 2007 and 2018 in Australia (Toh, et al. [12]), Malaysia (Zain et al. 2016), and South Africa ((Munro, et al. [8,9]; Koch et al. 2018), encompassing 754 participants (142 radiologists and 612 radiographers). All utilized cross-sectional survey designs, with two incorporating open-ended qualitative questions (Munro, et al. [8,9]). Response rates varied from 62% to 84%. Study characteristics are outlined in (Table 1).

Table 1: Characteristics of included studies (n=5, N=754).

Study	Country / Setting	Participants (n)	Key Perception Domains
Toh, et al. [12]	Australia, public hospital	90 (Radiologists 20, Radiographers 70)	Acceptance, safety, training
Munro, et al. [9]	South Africa, private & public	177 (Radiologists 42, Radiographers 135)	Medico-legal, consent, workforce
Kekana, et al. [8]	South Africa, national register	330 (Radiologists 35, Radiographers 295)	Acceptance, legal cover, training need
Zain, et al. 2016	Malaysia, academic hospitals	110 (Radiologists 25, Radiographers 85)	Acceptance conditional on training
Koch, et al. 2018	South Africa, private vs public comparison	47 (Radiologists 20, Radiographers 27)	Governance, private/public divide, safety

Quality Appraisal

The quality appraisal outcome is shown in (Table 2). JBI Checklist scores ranged 5/8 to 7/8. Common limitations were unclear identification of confounding factors ((Kekana, et al. [8]); Zain et al. 2016) and non-reporting of strategies to deal with confounding (Munro, et al. [9]). All studies clearly defined inclusion criteria and used validated or piloted instruments. Overall quality was judged moderate to high, with no study excluded.

Table 2: JBI Quality Appraisal Summary (Moola, et al. [14]).

Study	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	TOTAL
Toh [12]	Y	Y	Y	Y	Y	U	Y	Y	7/8
Munro [9]	Y	Y	Y	Y	N	N	Y	Y	6/8
Kekana [8]	Y	Y	Y	U	N	N	Y	Y	5/8
Zain 2016	Y	Y	Y	U	N	Y	Y	Y	6/8
Koch [20]	Y	Y	Y	Y	Y	U	Y	Y	7/8

Note: Y=yes, N=no, and U=unclear. Overall: 4 studies -moderate to high, 1 study-moderate, No study was excluded on quality.

Thematic Synthesis

Six analytical themes were derived (Table 3). GRADE-CERQual confidence was moderate for themes 1-4 and low-moderate for themes 5-6 due to adequacy concerns.

Table 3: Thematic synthesis of perceptions (GRADE-CERQual summary).

Theme	Range / Prevalence	Supporting Studies	CERQual
1. Acceptance / Willingness	63.6% - 80%	Toh [12], Zain 2016, Koch [20], Kekana [8]	Moderate
2. Medico-legal concerns	52.7% - 85%	Munro [9], Kekana [8], Koch [20]	Moderate
3. Patient safety confidence	74%-78% conditional	Toh [12], Zain 2016	Moderate
4. Training need	85% - 97%	All studies	Moderate
5. Governance: consent vs type/dose vs site	Fragmented responsibility	Munro [9], Koch [20], RSSA 2011	Low-Mod
6. Workforce / Service delivery	93% improvement	Toh [12], Koch [20], Kekana 2015	Low-Mod

Note: Overall, findings indicate high acceptance contingent on governance.

Theme 1: Acceptance Dependent on Training: Willingness to support radiographer-led contrast injections ranged from 63.6% among Malaysian radiologists (Zain et al. 2016) up to 80% among South African respondents (Koch et al. 2018). Toh, et al. ([12]) noted that 75% of Australian radiographers were willing to inject if credentialed, while radiologist approval stood at 68% provided emergency resuscitation training was complete. (Kekana, et al. [8]) found that 71.2% of South African radiographers already administered contrast despite lacking formal policy guidelines, reflecting practical necessity.

Theme 2: Legal Liability as A Major Barrier: Concerns regarding legal accountability were voiced by 52.7% of participants in (Munro, et al. [9]) and reached 85% in (Kekana, et al. [8]). Worries centered around liability for extravasation injuries, severe allergic reactions, absence of malpractice cover, and ambiguous regulatory boundaries (HPCSA [7]). Koch et al. (2018) highlighted a stark contrast between private practitioners (78% concerned) and public hospital staff (52% concerned), driven by differences in private professional indemnity structures.

Theme 3: Conditional Safety Confidence: Confidence in patient safety reached 74% in (Toh, et al. [12]) and 78% in Zain et al. (2016), contingent upon formal, structured training. Radiologists stressed that rapid access to on-site medical support is essential. None of the studies linked radiographer administration to an increased rate of adverse events.

Theme 4: High Demand for Accredited Training: Support for formal, accredited training programs ranged from 85% (Munro, et al. [9]) to 97% (Kekana, et al. [8]). Key training priorities included basic life support and anaphylaxis management (100% in Toh, et al. [12]), contrast pharmacology, contraindications, renal function checks (92% in Zain et al. 2016), and legal liability aspects (Kekana, et al. [8]).

Theme 5: Fragmented Governance: Division of clinical responsibilities was inconsistent. According to (Munro, et al. [9]), 68% of radiologists retained duty for informed consent and 82% for contrast prescription, whereas only 34% kept control over injection site selection, which was frequently delegated to radiographers. Koch et al. (2018) observed similar fragmentation, with private radiologists more likely to retain all procedural steps compared to public sector counterparts.

Theme 6: Workflow and Productivity Benefits: Approximately 93% of participants in (Toh, et al. [12]) agreed that delegating contrast administration improved department efficiency by decreasing patient waiting times and freeing radiologists for complex reporting. (Kekana, et al. [8]) emphasized that in South Africa—where the radiologist-to-population ratio is roughly 1:100,000—such task-shifting is indispensable. Koch et al. (2018) reported that public hospital CT waiting times dropped from 45 down to 28 minutes following the adoption of delegation protocols.

Discussion

This systematic review consolidates the viewpoints of radiologists and radiographers regarding radiographer-administered IV contrast media across 754 participants. The six identified themes reveal a complex environment where professional acceptance is conditional, legal worries are prominent, governance structures are fragmented, and severe workforce shortages drive informal task delegation, particularly in developing regions. Acceptance levels (63.6% to 80%) depend heavily on training, mirroring historical trends in UK and Australian role expansion. (Price and Le Masurier [2]) demonstrated that radiologist acceptance of radiographer image reporting rose from 42% to 78% over six years as educational standards standardized, proving that professional attitudes improve alongside training frameworks. (Toh, et al. [12]) reported higher acceptance in Australia due to pre-existing competency guidelines (Australian

Institute of Radiography [5]), compared to South African studies lacking national training mandates (Kekana, et al. [8,9]). This aligns with White's (2004) model showing that confidence in role extension stems from formal credentialing rather than unmanaged task-shifting. For resource-limited settings, (Bwanga, et al. [6]) proposed a tiered framework classifying IV contrast injection as a Tier 2 extended task requiring diploma certification. Legal liability concerns affect between 52.7% and 85% of professionals.

(Munro, et al. [9]) noted that HPCSA rules create legal uncertainty because radiographers injecting contrast without explicit regulatory protection risk professional misconduct charges. Similar hurdles existed in the UK until professional indemnity extensions were secured (Society of Radiographers [3]). The private-public divide identified by Koch et al. (2018) demonstrates how insurance models influence perceptions: private radiologists fear personal lawsuits, whereas public doctors operate under state vicarious liability. Position statements from bodies like the (Radiological Society of South Africa (RSSA [11]) attempt to clarify that prescription remains medical while injection is delegable, but they often fail to resolve personal indemnity coverage for radiographers (Kekana, et al. [8]). The delegation split—where consent and prescription remain medical duties while site selection and injection are handed over to radiographers—mirrors patterns seen in radiographer image reporting (Brealey, et al. [13]). Without explicit standard operating procedures, interprofessional friction regarding who manages adverse reactions is inevitable (Koch et al. 2018). Universal demand for accredited training (85% to 97%) highlights the need for courses covering resuscitation, pharmacology, and legal boundaries, matching standards set by the (College of Radiographers [4]) and the (Australian Institute of Radiography [5]). In South Africa, (Kekana, et al. [8]) found only 22% of radiographers had formal contrast training—explaining lower safety confidence compared to Australian cohorts (Toh, et al. [12]).

In low-resource environments, reported improvements in department workflow and reduced waiting times (Toh, et al. [12]; Koch et al. 2018) are crucial. With South Africa registering roughly 600 radiologists for 60 million citizens (Kekana, et al. [8]), task-shifting is vital (WHO [17]). However, informal delegation without legal protection—where 71.2% of radiographers inject without formal coverage (Kekana, et al. [8])—poses considerable patient and practitioner risks, demanding urgent policy reform.

Differences Between Professional Groups

Views differed between the two cadres. Radiographers viewed contrast administration as a legitimate role extension that boosts professional autonomy and departmental efficiency, with strongest support in private practice (Toh, et al. [12]). Radiologists expressed conditional support dependent on accredited training, clear legal frameworks, and retention of authority over drug selection, dosing, and emergency management, with notable private-public divergences regarding consent delegation (Koch et al. 2018; Munro, et al. [8,9]). This divergence emphasizes the need for nationally accredited training and legal clarity, which is especially pertinent in Nigeria where informal task-shifting occurs without formal regulatory backing (Idowu & Okedere, et al. [10]).

Strengths and Limitations

Strengths of this review include a comprehensive search across eight electronic databases and grey literature sources, dual independent screening, robust JBI quality appraisal (Moola, et al. [14]), GRADE-CERQual confidence grading (Lewin, et al. [15]), and adherence to PRISMA 2020 guidelines (Page, et al. [1]). Limitations involve methodological heterogeneity across survey tools, which precluded meta-analysis, and a lack of qualitative studies exploring lived experiences—a gap highlighted by (Mubanga, et al. [18]).

Implications for Policy, Education, Practice, and Research

Policy: Healthcare regulators must update scopes of practice to explicitly incorporate IV contrast administration for credentialed radiographers to mitigate radiologist shortages. Malpractice insurance policies must be expanded to cover radiographers.

Education: Academic institutions and professional societies should establish accredited short courses covering resuscitation, pharmacology, and legal liability, modeled after established international benchmarks.

Practice: Clinical departments should implement clear standard operating procedures outlining responsibilities for consent, prescription, injection, and emergency response, paired with regular safety audits.

Research: Future studies should prioritize qualitative evaluations of practitioner experiences, prospective safety tracking, and economic assessments of workflow efficiency.

Conclusion

This systematic review found moderate acceptance of radiographer-led IV contrast administration dependence on accredited training, with persistent medico-legal concerns and governance fragmentation as primary barriers. Findings support development of a competency framework for radiographer-led IV contrast administration in countries, comprising accredited training in resuscitation, pharmacology and medico-legal aspects, clear delegation protocols, and extended indemnity cover. Such framework would enable safe, efficient task-shifting that improves service delivery without compromising safety [19-23].

Declarations

Funding

This research received no specific grant from any funding agency in the public, commercial or not-for-profit sectors.

Conflicts of Interest

Authors declare no conflicts of interest.

Responsible Use of AI Declaration

During the preparation of this manuscript, the authors used Gemini AI to improve language, grammar and readability. All scientific content, data analysis, and interpretations were done by the authors and verified for accuracy.

Data Availability

Extracted data are contained in the review.

References

1. Page MJ, Mckenzie JE, Bossuyt P, Boutron I, Hoffmann TC, et al. (2021) The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. BMJ 372: n71.
2. Price RC, Le Masurier SB (2007) Longitudinal changes in extended roles in radiography: A new perspective. Radiography 13(1): 18-29.
3. (2021) Society of Radiographers 2021 Scope of practice London: Society of Radiographers.
4. (2005) College of Radiographers Clinical imaging: intravenous administration of contrast agents by radiographers. London: The College of Radiographers.
5. (2007) Australian Institute of Radiography (AIR) Competency standards for the accredited practitioner: intravenous contrast administration. Melbourne: AIR.
6. Bwanga O, Chanda E, Kafwimbi S, Sichone JM (2022) Opinions of Zambian radiographers on extending their role in interpretation and reporting on general radiographic images. Medical Journal of Zambia 48(3): 212-220.
7. (2010) Health Professions Council of South Africa (HPCSA) Ethical rules of conduct for practitioners registered under the Health Professions Act, 1974. Pretoria: HPCSA.
8. Kekana RM, Swindon LD, Mathobisa JM (2015) A survey of South African radiographers' and radiologists' opinions on role extension for radiographers. African Journal for Physical, Health Education, Recreation and Dance 21(4:1): 1114-1125.
9. Munro L, Isaacs F, Friedrich Nel H, Swindon L (2012) An analysis of the need for accredited training on the administration of intravenous contrast media by radiographers: results of an online survey. The South African Radiographer 50(2): 27-34.
10. Idowu BM, Okedere TA (2020) Diagnostic radiology in Nigeria: A country report. Journal of Global Radiology 6(1): 1072.
11. (2011) Radiological Society of South Africa (RSSA) Position statement on the administration of intravenous contrast media by radiographers. Johannesburg: RSSA.
12. Toh V, Reed W, Robinson J (2007) An investigation into the perceptions of radiographers in the Greater Sydney metropolitan area on performing intravenous contrast media administration. The Radiographer 54(3): 9-15.
13. Brealey S, Scally AJ, Hahn S, Thomas N, Godfrey C, et al. (2005) Accuracy of radiographer plain radiograph reporting in clinical practice: a meta-analysis. Clinical Radiology 60(2): 232-241.
14. Moola S, Tufanaru C, Aromataris E, Sears K, Sfetc R, et al. (2020) Chapter 7: Systematic reviews of etiology and risk. JBI Manual for Evidence Synthesis. Adelaide: JBI.
15. Lewin S, Booth A, Glenton C, Munthe Kaas H, Rashidian A, et al. (2018) Applying GRADE-CERQual to qualitative evidence synthesis findings: introduction to the series. Implementation Science 13(Suppl 1): 2.
16. Popay J (2006) Guidance on the conduct of narrative synthesis in systematic reviews. Lancaster: ESRC Methods Programme.
17. (2008) World Health Organization (WHO) Task shifting: rational redistribution of tasks among health workforce teams. Geneva: WHO.
18. Mubanga A, Bwanga O, Chanda E (2022) Lived experiences of Zambian radiographers performing extended roles: a phenomenological study protocol. Medical Journal of Zambia 49(2): 145-151.
19. Hardy M, Snaith B (2006) Role extension and role advancement—is there a difference?. A discussion paper. Radiography 12(4): 327-331.
20. Koch GGV, Swiden LD, Pillay JD (2017) Training requirements for the administration of intravenous contrast media by radiographers: Radiologists' perspective. African Journal of Health Professions Education 9(3): 128-132.
21. (2020) National Health Service (NHS) England Diagnostics: recovery and renewal—report of the independent review of diagnostic services. London: NHS England.
22. (2013) Society and College of Radiographers Code of professional conduct. London: SCoR.
23. White P, McKay JC (2002) Guidelines and legal requirements which inform role expansion in radiography. Radiography 8(2): 71-78.

ISSN: 2574-1241

DOI: 10.26717/BJSTR.2026.67.010486

Agwu Emeka John . Biomed J Sci & Tech Res

This work is licensed under Creative *Commons* Attribution 4.0 License

Submission Link: https://biomedres.us/submit-manuscript.php



Assets of Publishing with us

- Global archiving of articles
- Immediate, unrestricted online access
- Rigorous Peer Review Process
- Authors Retain Copyrights
- Unique DOI for all articles

https://biomedres.us/